

## PACKET CLASSIFICATION

### ABSTRACT

Methods and apparatus are provided for classifying data packets in data processing systems.

- 5 A first packet classification method determines which of a plurality of predefined processing rules applies to a data packet, where each rule is associated with a range of possible data values in each of a plurality of dimensions (X,Y) corresponding to respective data items in the packet format. For each dimension (X,Y), it is determined which of a set of predefined basic ranges contains the corresponding data value ( $I_1, I_2$ ) from the packet, where the basic ranges correspond to respective
- 10 non-overlapping value ranges between successive rule range boundaries in the dimension. For the basic range so determined for each dimension, a corresponding basic range identifier is selected from a set of predefined basic range identifiers corresponding to respective basic ranges in that dimension. For each of at least two dimensions (X,Y), the basic range identifiers comprise respective  $p_D$ -bit strings generated independently for that dimension by a process of deriving a primitive range
- 15 hierarchy based on the rule ranges in that dimension. The resulting basic range identifiers, one for each dimension, are then combined to produce a search key which is supplied to a ternary content-addressable memory (5). In the memory (5), the search key is compared with a set of ternary rule vectors, each associated with a particular rule and derived for that rule from the aforementioned hierarchies, to identify at least one rule which applies to the data packet. A second method classifies
- 20 data packets according to the values in respective data packets of a single, predetermined data item (DA) in the data packet format, where a plurality of classification results are predefined for respective ranges of values of the data item (DA). Here the data item (DA) in the packet is first segmented. The resulting segments are then equated to different dimensions (X,Y) of a multidimensional packet classification problem and are processed in a similar manner to identify a classification result for the
- 25 packet.